

CLEANUP CRITERIA FOR THE WEST VALLEY DEMONSTRATION PROJECT

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Abstract

The US Nuclear Regulatory Commission (NRC) is prescribing decontamination and decommissioning (cleanup) criteria for the West Valley Demonstration Project and the West Valley, New York, site. The site is contaminated with various forms of residual radioactive contamination and contains a wide variety of radioactive waste. The NRC is planning to issue cleanup criteria for public comment in Fall 1999. Due to the complexity of the site, and the newness of NRC's cleanup criteria policy, applying NRC's cleanup criteria to this site will be an original regulatory undertaking.

Introduction

The US Nuclear Regulatory Commission (NRC) is authorized, by law, to prescribe decontamination and decommissioning (cleanup) criteria for the US Department of Energy's (DOE's) West Valley Demonstration Project and the NRC-licensed portion of the State of New York's Western New York Nuclear Service Center located at West Valley, New York. The West Valley Demonstration Project is an ongoing liquid high-level radioactive waste solidification project at the site of a former commercial spent nuclear fuel reprocessing facility. The NRC is planning to issue a draft policy statement, for public comment, prescribing the cleanup criteria in Fall 1999. The health, safety, and environmental impacts of cleaning up and closing or long-term management of the site are being evaluated by the DOE and the New York State Energy Research and Development Authority, with NRC participation. The site poses a unique technical and regulatory challenge because of the wide variety of residual radioactivity and radioactive wastes at the site.

Background

From 1966 to 1972, a private company (Nuclear Fuel Services) ran a facility that reprocessed 640 metric tons of spent nuclear fuel at New York State's Western New York Nuclear Service Center. This was the only facility in the US that reprocessed spent nuclear fuel from commercial nuclear power reactors. The facility shut down, in 1972, for modifications to increase its seismic stability and to expand capacity. In 1976, without restarting the operation, Nuclear Fuel Services withdrew from the reprocessing business and returned control of the facilities to the site owner, the New York State Energy Research and Development Authority.

The reprocessing operations resulted in a wide range of radioactive wastes and residual radioactive contamination including:

- Approximately two million liters (600,000 gallons) of liquid high-level radioactive waste, stored below ground in waste tanks;

- A reprocessing building that is contaminated with residual radioactive waste including: fuel cladding hulls residually contaminated with spent nuclear fuel; activated fuel hardware; and potentially particles of spent nuclear fuel;
- Unreprocessed spent nuclear fuel stored in a fuel pool;
- A wide range of radioactive wastes in two onsite burial grounds - one for plant radioactive wastes, one for radioactive wastes primarily from offsite sources;
- A series of liquid low-level radioactive waste treatment ponds with residually contaminated soils and sediment;
- Ground water contaminated with high concentrations of Strontium-90, from a process leak; and
- A prong-shaped area of Cesium-137 surface soil contamination, which extends offsite, from an inadvertent stack release.

The facility at West Valley was licensed by the US Atomic Energy Commission, and then the NRC, until 1981, when the license was suspended and site control turned over to the DOE, to execute the 1980 "West Valley Demonstration Project Act" [Ref 1]. The "West Valley Demonstration Project Act" authorized the DOE, in cooperation with the New York State Energy Research and Development Authority--the owner of the site and the holder of the suspended NRC license--to: (1) carry out a liquid high-level radioactive waste management demonstration project; (2) solidify, transport, and dispose of the liquid high-level radioactive waste at the site; (3) dispose of low-level radioactive waste and transuranic waste produced by the liquid high-level radioactive waste solidification; and (4) decontaminate and decommission (cleanup) facilities used for the solidification, in accordance with requirements prescribed by the NRC. The New York State Energy Research and Development Authority is responsible for remediating site facilities and areas outside the scope of the "West Valley Demonstration Project Act." Although the NRC suspended the site license until completion of the West Valley Demonstration Project by the DOE, the NRC was given certain responsibilities, under the "West Valley Demonstration Project Act," that include prescribing cleanup criteria.

The West Valley Demonstration Project is currently removing liquid high-level radioactive waste from the tanks at the site, vitrifying it, and storing it onsite for eventual offsite disposal. The vitrification operations are nearing completion. In addition to the vitrified high-level radioactive waste, the West Valley Demonstration Project operations have also produced large quantities of low-level radioactive and transuranic wastes which, for the most part, have been stored onsite.

In 1989, the DOE and the New York State Energy Research and Development Authority began developing a joint Environmental Impact Statement, under the guidelines of the "National Environmental Policy Act," to study project completion and closure or long-term management of the site. This process involves the evaluation of waste disposal and cleanup alternatives for the site, with the goal of demonstrating and selecting a preferred alternative. However, the "West Valley Demonstration Project Act" requires the NRC to prescribe cleanup criteria for the project. Thus, the NRC and the DOE agreed on the NRC's participation as a cooperating agency, in the Environmental Impact Statement process, with the DOE and the New York State Energy Research and Development Authority, so that the NRC could review the cleanup alternatives, in light of its role of prescribing the cleanup criteria. The draft Environmental Impact Statement was published in 1996.

The draft Environmental Impact Statement contained four viable alternatives for project completion and closure or long-term management of the site. They were:

- 1) Removal of all residual contamination and waste from the site and release of the site for unrestricted use;
- 2) Packaging and on-premises storage of all residual contamination and waste and placement of restrictions on the use of the site;
- 3) In-place stabilization of all non-containerized residual contamination and waste, and on-premises disposal of previously packaged low-level radioactive waste, and placement of restrictions on the use of the site; and
- 4) No remedial action, placement of restrictions on the use of the site, active monitoring, and maintenance of the site.

A range of cost estimates for the various alternatives for closure or long-term management of the site was developed in the draft Environmental Impact Statement. The estimated costs to implement these alternatives range from 1.3 to 8.8 billion US dollars. It is predicted that the cleanup of the site will take 15 years to complete.

The analysis in the draft Environmental Impact Statement identified various environmental pathways by which residual radioactivity and waste could be transported from the West Valley site to the public if the residual radioactivity and waste were to remain at the site and were, or were to become, uncontrolled. The primary environmental transport and human exposure pathways for the residual radioactivity and waste are believed to be: 1) subsurface water leaching and movement into ground-water wells; or 2) erosion of the surrounding earth, subsequent uncovering of residual radioactivity and waste, and then human ingestion of it and direct exposure to it. Preliminary calculations suggest that the dose to humans through these pathways would be unacceptably high at West Valley.

After public release of the draft Environmental Impact Statement document, the West Valley Demonstration Project convened an advisory board of local citizens, called the West Valley Citizen Task Force, that began meeting in early 1997. This group was formed to obtain stakeholder input on the draft Environmental Impact Statement. The Citizen Task Force recommendations, for the preferred alternative in the draft Environmental Impact Statement, were completed in July 1998. The Citizen Task Force generally does not believe that the West Valley site is suitable for long-term isolation of residual radioactivity and waste and, therefore, favors cleanup and disposal of the residual radioactivity and waste at suitable and safe offsite disposal facilities.

The NRC's Cleanup Criteria Policy for West Valley

The NRC's policy at West Valley is to apply the NRC's License Termination Rule [Ref 2] as the cleanup criteria for the site. The License Termination Rule requires meeting dose-based cleanup criteria for the termination of an NRC license. The License Termination Rule does not apply a single public dose criterion. Rather it provides for a range of criteria from 0.25 mSv (25 mrem)/year to as much as 1 mSv (100 mrem)/year for unrestricted license terminations. NRC licenses can also be terminated under restricted release conditions [i.e., the use of institutional controls to keep doses to the public below 0.25 mSv (25 mrem)/year]. Because it is considered unlikely that a site released under durable institutional controls (generally Government control) would lose those controls, the cleanup criteria for termination of the license in that situation can range up to 5 mSv (500 mrem)/year.

If, however, meeting the dose criteria of the NRC's License Termination Rule at a site like West Valley would incur more risks (i.e., damage to the environment and risks to the public and workers from remediation), or costs (i.e., be prohibitively expensive), than benefits (i.e., reduction of potential future doses to members of the public) it may be necessary for the site (or portions thereof) to be kept under an NRC license, to ensure that exposures to the public are appropriately monitored. However, the evaluation of maintenance of a site, or a portion of that site, under a continued license, is outside the scope of the License Termination Rule, because the rule only contains provisions that apply to termination of a license. Outside of uranium mill tailings sites, the NRC has not had to apply the concept of a continued license for ensuring public health and safety from residual radioactivity at sites that the NRC regulates.

The NRC's policy for prescribing the License Termination Rule as the cleanup criteria for the West Valley Demonstration Project and the West Valley site will be published in draft form for public comment. In addition, the NRC will hold a public meeting near the West Valley site to solicit public comment on the draft. After consideration of the public comments, the NRC will finalize the policy statement, publish it, and distribute it to all interested parties. The potential limitations of the License Termination Rule relative to the cleanup of West Valley will have to be considered in the continued evaluation of the environmental impacts of completing the West Valley Demonstration Project, the eventual reactivation of the site license by the NRC, and the closing or long-term management of the site.

References

- [1] "West Valley Demonstration Project Act." US Public Law 96-368 (1980).
- [2] "Radiological Criteria for License Termination." US Code of Federal Regulations, Title 10, Part 20, Subpart E.